

CLAIM AMENDMENTS:

Claims 1-14 (Canceled).

Claim 15 (Currently Amended): A power semiconductor device made in accordance with ~~the~~ a method of ~~claim 1~~ comprising the steps of:

- A. providing a substrate of a first or second conductivity type;
- B. forming a voltage sustaining region on said substrate by:
 - 1. depositing an epitaxial layer on the substrate, said epitaxial layer having a first conductivity type;
 - 2. forming at least one trench in said epitaxial layer;
 - 3. depositing a barrier material along the walls of said trench;
 - 4. implanting a dopant of a second conductivity type through the barrier material into a portion of the epitaxial layer adjacent to and beneath the bottom of said trench;
 - 5. diffusing said dopant to form a first doped layer in said epitaxial layer;
 - 6. removing the barrier material from at least the bottom of the trench;
 - 7. etching the trench through said first doped layer and repeating steps (B.3) – (B.6) to form a second doped layer vertically below said first doped layer;
 - 8. depositing a filler material in said trench to substantially fill said trench;
 - 9. diffusing said dopant in the first and second doped layers to cause the first and second doped layers to overlap one another; and
- C. forming over said voltage sustaining region at least one region of said second conductivity type to define a junction therebetween.

Claim 16 (Currently Amended): A power semiconductor device made in accordance with ~~the~~ a method of ~~claim 6~~ comprising the steps of:

- A. providing a substrate of a first or second conductivity type;
- B. forming a voltage sustaining region on said substrate by:
 - 1. depositing an epitaxial layer on the substrate, said epitaxial layer having a first conductivity type;
 - 2. forming at least one trench in said epitaxial layer;
 - 3. depositing a barrier material along the walls of said trench;
 - 4. implanting a dopant of a second conductivity type through the barrier material into a portion of the epitaxial layer adjacent to and beneath the bottom of said trench;
 - 5. diffusing said dopant to form a first doped layer in said epitaxial layer;
 - 6. removing the barrier material from at least the bottom of the trench;
 - 7. etching the trench through said first doped layer and repeating steps (B.3) – (B.6) to form a second doped layer vertically below said first doped layer;
 - 8. depositing a filler material in said trench to substantially fill said trench;
 - 9. diffusing said dopant in the first and second doped layers to cause the first and second doped layers to overlap one another; and
- C. forming over said voltage sustaining region at least one region of said second conductivity type to define a junction therebetween,
wherein said material filling the trench is high resistivity polysilicon.

Claim 17 (Currently Amended): A power semiconductor device made in accordance with the a method of ~~claim 14~~ comprising the steps of:

- A. providing a substrate of a first or second conductivity type;
- B. forming a voltage sustaining region on said substrate by:
 - 1. depositing an epitaxial layer on the substrate, said epitaxial layer having a first conductivity type;
 - 2. forming at least one trench in said epitaxial layer;

3. depositing a barrier material along the walls of said trench;
 4. implanting a dopant of a second conductivity type through the barrier material into a portion of the epitaxial layer adjacent to and beneath the bottom of said trench;
 5. diffusing said dopant to form a first doped layer in said epitaxial layer;
 6. removing the barrier material from at least the bottom of the trench;
 7. etching the trench through said first doped layer and repeating steps (B.3) – (B.6) to form a second doped layer vertically below said first doped layer;
 8. depositing a filler material in said trench to substantially fill said trench;
 9. diffusing said dopant in the first and second doped layers to cause the first and second doped layers to overlap one another; and
- C. forming over said voltage sustaining region at least one region of said second conductivity type to define a junction therebetween,
- wherein said power semiconductor device is selected from the group consisting of a vertical DMOS, V-groove DMOS, and a trench DMOS MOSFET, an IGBT, and a bipolar transistor.

Claim 18 (Original): A power semiconductor device comprising:

- a substrate of a first or second conductivity type;
- a voltage sustaining region disposed on said substrate, said voltage sustaining region including:
 - an epitaxial layer having a first conductivity type;
 - at least one trench located in said epitaxial layer;
 - at least one doped column having a dopant of a second conductivity type, said column being formed from a plurality of doped layers diffused into one

another, said doped layers being located in said epitaxial layer adjacent a sidewall of said trench and arranged vertically one over the other;
a filler material substantially filling said trench; and
at least one region of said second conductivity disposed over said voltage sustaining region to define a junction therebetween.

Claim 19 (Original): The device of claim 18 wherein said at least one region further includes:
a gate dielectric and a gate conductor disposed above said gate dielectric;
first and second body regions located in the epitaxial layer to define a drift region therebetween, said body regions having a second conductivity type; and
first and second source regions of the first conductivity type located in the first and second body regions, respectively.

Claim 20 (Original): The device of claim 18 wherein said material filling the trench is high resistivity polysilicon.

Claim 21 (Original): The device of claim 18 wherein said material filling the trench is a dielectric material.

Claim 22 (Original): The device of claim 21 wherein said dielectric material is silicon dioxide.

Claim 23 (Original): The device of claim 21 wherein said dielectric material is silicon nitride.

Claim 24 (Original): The device of claim 18 wherein said dopant is boron.

Claim 25 (Original): The device of claim 20 wherein said body regions include deep body regions.

Claim 26 (Original): The device of claim 18 wherein said trench has a circular cross-section.

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Claim 27 (Original): The device of claim 18 wherein said trench has a cross-sectional shape selected from the group consisting of a square, rectangle, octagon and a hexagon.